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The Impact of Language and Culture on Technical Communication in Japan

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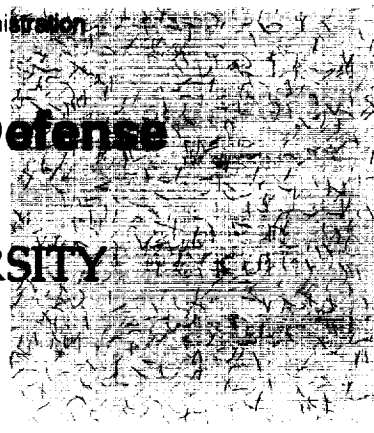

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SUMMARY

One of the most significant developments in the field of technical communication during the 1980s and 1990s has been a growing interest in international technical communication, including technical communication in Japan. This article provides insights into aspects of the Japanese language and culture that affect Japanese technical communication practices. The authors then use these insights to interpret and report the results of a survey of Japanese aerospace engineers and scientists concerning the kinds of communication products they produce, the kinds they use, and the specific recommendations they would offer to designers of academic programs in technical communication.

One of the most significant developments in the field of technical communication during the 1980s and '90s has been a growing interest in international technical communication. The focal point of this interest has often been communication with the Japanese. Many Western technical communicators, like Jenkins and Miller (1991), have already worked closely with Japanese engineers and scientists as technical writers, editors, or even English teachers. Others interact frequently with Japanese translators, publishers, vendors, and representatives of corporate affiliates.

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In all of these interactions, familiarity with the Japanese language, culture, and communication practices is essential to effective communication. This familiarity can be gained in a number of ways. For example, one can quickly become familiar with Japanese and other languages—without years of language study—simply by referring to encyclopedias or to Swan and Smith's excellent reference (1987) on the major points of contrast between English and 19 other language groups. Familiarity with Japanese-American cultural contrasts can be increased by consulting sources such as Hall and Hall (1987), Condon (1984), and Reischauer (1977).

This information on the Japanese language and culture can help technical communicators to anticipate and understand translation problems or to understand anomalies in a Japanese author/speaker's English grammar or communication style.

To contribute to our understanding of international technical communication practices, the NASA/DoD Aerospace Knowledge Diffusion Research Project is examining the flow of scientific and technical information at the individual, organizational, national, and international levels. A joint effort of the Indiana University Center for Survey Research and the NASA Langley Research Center, this multi-phase research project is providing descriptive and analytical data that should prove useful to information managers, research and development (R&D) managers, and others who are concerned with improving the utilization and communication of scientific and technical information (Pinelli, Kennedy, and Barclay 1991).

In Phase 4 of the project, data on the communication practices of aerospace engineers and scientists in selected countries is being collected and compared to previously analyzed data on the communication practices of U.S. aerospace engineers and scientists. To date, pilot study data have been collected in Japan, Israel, and several Western European nations, and similar studies are planned for the former U.S.S.R. and for Brazil.

The Japanese pilot study is particularly interesting for a number of reasons. First, the Japanese culture is perhaps as different from that of the U.S. as the culture of any other developed nation; hence, it has the potential to provide us with instructive contrasts and insights into the influence of language and culture on communication practices.

A second reason for investigating Japanese technical communication practices is that very few such studies have been conducted. The bulk of the literature on Japanese communication focuses on interpersonal and business communication rather than on technical communication. Our survey of journals in technical communication and related areas uncovered only two empirical studies (Stevenson 1983 and Cutler 1988) and one qualitative (or ethnographic) study (Haas and Funk 1989) of technical communication in Japan.

In addition, many of the opinions on Japanese attitudes and communication practices that we have encountered are not adequately supported by observations, examples, or empirical data. And, as Yum (1991) explains, "many cross-cultural studies of communication simply describe foreign communication patterns and then compare them to those of North America, rarely going beneath the surface to explore the source of such differences" (p. 66).

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Nevertheless, there is widespread agreement about many aspects of Japanese language, culture, and communication. By consolidating information on these topics from a wide variety of sources, we believe that we have gained a reasonably accurate conception of the key factors that influence Japanese technical communication.

In this article we begin by examining the most important of these factors: the ambiguity of the Japanese language. We believe that an understanding of this factor is essential to understanding Japanese communication practices and attitudes toward communication. Next we examine the attitudes of the Japanese toward ambiguity, and we discuss the effects of ambiguity on Japanese communication. Finally, we present the results of our survey of Japanese aerospace engineers and scientists, interpreting the data in the light of what we have learned about Japanese language, culture, and communication.

THE AMBIGUITY OF THE JAPANESE LANGUAGE

Of all the themes that appear in the literature on Japanese communication, the one that appears most

frequently—and the one that seems to be most intimately related to Japanese culture—is the ambiguity of the Japanese language. Without understanding some of the sources of this ambiguity, a non-Japanese cannot appreciate the effect of its influence on Japanese communication practices. Nor can one fully understand the Japanese culture without knowing something about the language.

But before focusing on ambiguity, let's take a brief look at the Japanese language in more general terms. To begin with, Japanese is perhaps as different from English and other Indo-European languages as any other language in the world. Moreover, despite its use of the Chinese writing system (along with two other, coexisting writing systems), it is equally different from Chinese. The only language that Japanese is widely presumed to be related to is Korean, though it also bears some similarities to Mongolian and Turkic languages (Miller 1977, pp. 22–23).

The differences between English and Japanese are remarkable. Japanese lacks articles (*a, an,* and *the*), and plurals are seldom indicated. Thus, the single Japanese word *inu* can have six different translations in English: dog, dogs, a dog, some dogs, the dog, and the dogs. Japanese has no relative pronouns, so relative clauses, no matter how long, must precede their nouns. Both prepositions and grammatical relationships are indicted by particles such as *-ga* (the subject marker) and *-o* (the object marker), which are "tacked on" to content words, as in *John-ga hon-o yonda* (John-subject book-object read = John read the book). Adjectives are indistinguishable from verbs because both are inflected for tense.

One of the best-known characteristics of Japanese is its elaborate honorific language, which requires that different verb forms and even different vocabulary be used according to the speaker's attitudes toward (1) the person who is being addressed, and (2) the topic that is being discussed. In addition, communications of many kinds, including instructions and warnings, are expressed more indirectly, tentatively, and politely than they are in English. (For a more complete discussion of English/Japanese contrasts, see Thompson 1987.)

The ambiguity of the Japanese language arises partly from a cultural preference for indirectness and partly from the fact that Japanese is typically a "situation-focused" language, in which subjects and even objects of sentences are often omitted. For example, where an English speaker would say "I just heard someone shout," focusing on the people involved in the situation, a Japanese speaker might say "*Sakebigoe ga shita zo*"—"A shouting voice occurred" (Monane and Rogers 1977).

Borrowings from Chinese have also contributed greatly to the ambiguity of Japanese. As Reischauer (1977, p. 389) explains, between the sixth and the ninth centuries A.D., the Japanese adopted thousands of Chinese words. However, because the phonetic system of Chinese includes many more consonants and vowel sounds than that of Japanese, and because Chinese is a tonal language whereas Japanese is not, a great many words that sound different in Chinese are pronounced alike in Japanese. For example, "some twenty Chinese syllables, running from *kao* to *kuang* and *hsiao*, each theoretically divisible into four tones for a total of eighty distinct syllables, reduce to the single syllable *ko* in Japanese" (Reischauer 1977, p. 390).

The Japanese *kanji* writing system, like the Chinese system from which it came, is similarly ambiguous, because a single borrowed Chinese character is often used to represent several distinct meanings. For example, the Chinese character for "to give birth to" has seven distinct meanings in Japanese (Reischauer 1977, p. 391). By comparison, English homographs are less common, and they seldom have more than two distinct pronunciations or meanings.

Ambiguity on the supra-sentential level can result from the fact that transitional devices are used less frequently in Japanese than in English, and they are sometimes much more subtle. For example, the particle *wa*, which usually indicates "given" information, may also serve as a cue to the reader that the next idea is somehow related to a previous idea; however, "it is the reader's responsibility to look for the connection" (Hinds 1987, pp. 146–150). In texts that are translated from Japanese to English, the difference in number and type of transitional cues often contributes to an apparent lack of unity and to a distortion of logical relationships (Mackin 1989, p. 348).

JAPANESE ATTITUDES TOWARD AMBIGUITY

For the Japanese, the ambiguity of their language is simultaneously a source of bewilderment and fascination. On the one hand, they lament the difficulty of communicating ideas precisely and logically in Japanese, while on the other hand, Miller (1977) claims that they have an almost mystical fascination for the "ineffability" of their language (p. 15). In his well-researched account of the attitudes of the Japa-

nese toward their language, Miller also states that an astounding "amount of energy and effort in Japan . . . goes into writing and publishing books that deal exclusively with questions about the language" (p. 3). He adds that one frequently reads "statements to the effect that the language somehow has an overwhelming significance and a profoundly moving content for its speakers and users" (p. 17).

But while many Japanese and non-Japanese alike lament the ambiguity of the Japanese language, Reischauer (1977) protests that "there is nothing about the Japanese language which prevents concise, clear, and logical presentation, *if that is what one wishes to make*" (pp. 385–386, emphasis added). Similarly, Mackin (1989) states that "external facts in Japanese are expressed in a straightforward manner," not unlike the English sentence "The experiment generated a heat of 12⁴ kilocalories" (p. 349).

While it may seem incomprehensible to Westerners that the Japanese actually value ambiguity, a closer examination of some aspects of Japanese culture makes this attitude understandable—and it is important that we understand and accept the Japanese attitude toward ambiguity.

Nevertheless, in certain contexts at least, ambiguity is regarded as stylistically and aesthetically preferable to clarity and directness. For example, Dennett (1988) quotes a Japanese physicist as saying, "If you translate from English to Japanese, the translated material must be in a sense vague . . . so that you get good Japanese" (p. 116). Similarly, Miller (1977) claims that "[Japanese authors] dislike clarification and full explanation of their views; they like giving dark hints[,] and [they] attempt to leave behind them nuances" (p. 35). But he emphasizes that "in Japan this is exactly the type of prose that gets the highest praise from readers" (p. 35).

While it may seem incomprehensible to Westerners that the Japanese actually value ambiguity, a closer examination of some aspects of Japanese culture makes this attitude understandable—and it is important that we understand and accept the Japanese attitude toward ambiguity if we are to have any true understanding of Japanese culture and communication.

First, because Japan developed for centuries with relatively little outside influence, it is an extremely homogeneous society. The context of everyday life is deeply and widely shared, so there is often little need to be explicit.

Second, because individuality is subordinated to group identity, events or situations are regarded as more important than the individuals who created them.

Finally, indirectness and tentativeness are valued as means of preserving harmony; hence, a skilled communicator is often defined as one who is adept at understanding what is left unsaid.

THE INFLUENCE OF AMBIGUITY ON JAPANESE COMMUNICATION

The ambiguity of the Japanese language can be seen as a contributing factor toward many aspects of Japanese communication:

- Greater reliance on oral, small-group communication, and less reliance on both large-group and written communication
- Greater emphasis on visual communication
- The attitude that the reader/listener is primarily responsible for the success of communication
- Widespread use of English to communicate scientific and technical information

Oral vs. Written Communication

Because its potential for ambiguity is so great, the Japanese language is widely regarded by the Japanese themselves as most suitable for oral communication within small groups. (In small groups, effective communication can be promoted by shared context, body language, and the opportunity to request clarification.) Indeed, for centuries the language was regarded as "wholly unsuitable for talk addressed to large numbers of people"; there was no word for "speech" in the sense of a public declamation until the late nineteenth century (Oliver 1989, pp. 46-47). Even today, many Japanese persist in this belief. In a 1983 essay, for example, Okabe asserts that "Japanese is basically a 'chamber' language, not suitable for public discussion or speech at a big hall" (p. 38).

The claim that the Japanese rely more on oral communication and less on written communication than Americans is supported by several sources. For example, in their ethnographic study of Japanese technical communication, Haas and Funk (1989)

found that "shared information is primarily spoken rather than written." They also noted that "work groups met formally as often as twice a day," and that "matters of office procedure, upcoming deadlines, even notices of social events, which might be conveyed in memos in the U.S., were announced publicly at department meetings" (pp. 364–365). Similarly, Cutler (1988) observes that "it is difficult to track research activities in Japan because there are no paper trails, no intermediate publication points" (p. 45).

Emphasis on Visual Communication

The ambiguity of the Japanese language may also contribute to the Japanese emphasis on visual communication. (The pictographic nature of the Japanese writing system is another reason that is often cited for the widely acknowledged visual orientation of the Japanese.) This emphasis is seen even in grade schools, in which contests are held to encourage pupils to design interesting and effective charts and graphs. Japanese user documentation often contains flow charts to direct the user to the appropriate section of the document based on his/her level of experience and needs (Amemiya 1987, p. 7); attractive design and illustrations are important elements of audience appeal (Aizu and Amemiya 1985, pp. WE34–35). Moreover, Japanese charts and graphs are often very complex, containing much more information than Americans are accustomed to "processing" visually (Rowland 1987, p. 6; Haas and Funk 1989, p. 364).

"Reader Responsibility" and Japanese Education in Writing

In both oral and written communication, the ambiguity of the Japanese language probably also contributes to the attitude that it is the reader/listener who is primarily responsible for the success of communication (Hinds 1987). Expressed another way, this concept of "reader responsibility" reflects little awareness of what are seen in the U.S. as the basic concepts of technical communication. For example, Stevenson (1983) found that the Japanese engineers and managers he interviewed were "largely unfamiliar" with the concept of audience adaptation and that they were more concerned with grammaticality than with "whether the message was really comprehensible by the intended user" (p. 324).

Mackin (1989), on the other hand, states that

Perhaps the most surprising effect of the ambiguity of the Japanese language on Japanese communication is the fact that a significant proportion of technical information in Japan is written in English.

"most of the 20,000 Japanese engineers in [his] company feel that the writer should provide all of the necessary information in a very clear and concise format" (p. 348). He also believes that much of the lack of clarity and structure in Japanese texts "is due to a lack of education in writing and document design and not to cultural differences in thinking" (p. 349).

While it is probably true that the attitude of "reader responsibility" is typical of untrained writers all over the world, this attitude also contributes to a lack of emphasis on writing instruction both in Japan and in many other countries. After all, if the writer's role were viewed as more important for effective communication, then more time and resources would most likely be devoted to teaching students how to fill that role more effectively.

In Japan, there is no writing instruction of any kind beyond the sixth grade (Hinds 1983, p. 79). Moreover, Amemiya reports that in the Japanese educational system as a whole, written Japanese is not usually treated "as a vehicle for expressing facts or for the logical development of ideas." "On the contrary," he says, "Japanese students at all levels are instructed more in the literary possibilities of written Japanese" (quoted in Dennett 1988, p. 116).

To their credit, Japanese firms have filled the void in writing instruction by developing their own in-house training programs for technical communicators (Nakajima 1991; Hayashi 1991). The Fujitsu program described by Hayashi (1991) includes two months of intensive technical training, a seven-month traineeship in system development, nine months' employment in user training, and six months in materials development. Thus, before they begin to work as writers, many employees gain not only in-depth technical knowledge, but also experience in responding to the needs of users.

Use of English for Technical Communication in Japan

Perhaps the most surprising effect of the ambiguity of the Japanese language on Japanese communi-

cation is the fact that a significant proportion of technical information in Japan is written in English. Stevenson (1983) stated that "written Japanese is simply ill-suited to the need for unambiguous expression which is the basic requirement of the language of science and technology." In 1983, he reported that of the 70 Japanese engineers and managers he interviewed, 44% said they write in English only; 22% wrote in Japanese only, and 34% said they write "in both" (pp. 322–323).

With its more precise and logical structure, English is easier than Japanese to translate into other languages; the pool of qualified translators is also greater, making it more cost-effective and efficient to write in English many documents that are destined for translation. However, Stevenson (1983) points out that engineers, technicians, and managers also routinely use English to communicate among themselves (p. 321).

In addition to ambiguity, there are undoubtedly other aspects of Japanese language and culture that affect technical communication in Japan. Some of these will be mentioned in the following discussion of our survey results.

Survey Methodology

A list of approximately 50 U.S. and 13 Japanese aerospace engineers and scientists served as the sample frame for the NASA/DoD Phase 4 pilot study. All of these engineers and scientists were working in the fields of cryogenics, magnetic suspension, and adaptive walls. We sent multiple questionnaires to each member of the sample and asked that each recipient distribute the survey to colleagues. We received 63 U.S. and 96 Japanese responses by the established cutoff date.

Survey Findings

Demographic Information About Survey Respondents

Survey respondents were asked to provide information regarding their professional duties, organizational affiliation, years of professional work experience, gender, and whether English was their first (native) language. These demographic findings appear in Table 1.

A comparison of the two groups reveals that they are similar in education, educational preparation, and gender. They differ in professional duties, organizational affiliation, years of professional work experience, and current duties. We speculate that differences in organizational affiliation and professional duties may account for some variations in the responses of the two groups. However, we took these differences into account in our analysis of the data and in the discussion which follows.

TABLE 1
Demographic Findings

	Japan	U.S.
Professional duties		
Design/development	27%	14%
Admin./management	2	27
Research	40	35
Other	31	24
Organizational affiliation		
Industry	37%	24%
Government	26	41
Academia	36	24
Not for profit	1	0
Other	0	11
Professional work experience		
0–9 years	26%	8%
10–19 years	35	14
20–29 years	24	34
30 or more years	15	44
Education		
Bachelor's degree or less	22%	18%
Postgraduate	78	82
Educational Preparation		
Engineer	91%	86%
Scientist	9	14
Current Duties		
Engineer	91%	68%
Scientist	6	10
Other	3	22
English first (native) language	0%	89%
Gender		
Male	99%	98%
Female	1	2

Time Spent Communicating Technical Information

According to Hall (1976), Japan (unlike the U.S.) is a high-context society, in which information is widely and freely shared. Even the typical Japanese office arrangement, in which dozens of workers share a common workspace, with desks arranged in groups and separated only by low dividers (Haas and Funk 1989, p. 364), would seem to encourage communication. Hence, we might expect Japanese engineers and scientists to spend more time commu-

nicating technical information than their American counterparts.

However, when subjects were asked how many hours per week they spend communicating technical information, the median for Japanese respondents was 5 hours, compared to 10 hours for the Americans (Table 2). We believe that the explanation for this apparent contradiction can be found in our earlier claim that the Japanese rely more on oral communication than on written communication. Because it takes less time to communicate orally than in writing, it is not surprising that the median for the Japanese was lower.

TABLE 2

Median Number of Hours Spent Each Week by Japanese and U.S. Aerospace Engineers and Scientists in Communicating Technical Information

	Japan	U.S.
Communications with others	5.0 hrs/wk	10.0 hrs/wk
Working with communications from others	10.0 hrs/wk	10.0 hrs/wk
Percent of work week devoted to technical communications*	37.5%	50%

*based on a 40-hour work week

Production of Technical Information

When survey participants were asked how many times they wrote or prepared various types of technical information, their responses further confirmed the Japanese emphasis on oral communication. For example, the Japanese respondents produce far fewer memos (the most common form of internal written communication) than their American counterparts (Table 3). As Funk (1988) observed, in Japan "projects . . . are set up quickly, without paperwork or written requisitions. Employees from one department frequently visit other departments in order to coordinate their activities" (p. 58).

Table 3 also shows that the Japanese produce fewer letters, audiovisual materials, and technical talks/presentations than the U.S. respondents. They produce *more* of certain scholarly or research-based types of publications such as abstracts, in-house technical reports, and journal articles, and they write the same number of conference/meeting papers and technical proposals as their U.S. counterparts. However, these latter types of documents are written less frequently than the others, and the low numbers that are involved make these median figures less meaningful. Thus, although the Japanese do use written communication at least as often as U.S. aerospace engineers and scientists to document and report their research, it seems clear that they rely on informal oral communication for many kinds of information that are communicated in writing in the U.S.

TABLE 3

Median Number of Technical Information Products Produced in the Past Six Months by Japanese and U.S. Aerospace Engineers and Scientists

	Japan	U.S.
Letters	5	10
Memos	1	6
Audiovisual materials	0	4
Technical talks/presentations	2	3
Conference meeting papers	1	1
Technical proposals	1	1
Abstracts	2	1
In-house technical reports	2	1
Journal articles	1	0
Drawings/specifications	0	0
AGARD technical reports	0	0
Computer program documentation	0	0
Technical manuals	0	0
Trade/promotional literature	0	0
U.S. government technical reports	0	0

Use of Technical Information Received From Others

We also asked subjects how many hours per week they spend working with technical information *received from others*. For this question, the medians for the Japanese and the Americans were the same—10 hours per week (Table 2). However, when asked how many times they had used particular types of technical information during the past six months, the Japanese reported using far fewer memos, letters, and audiovisual materials, but more abstracts, con-

ference/meeting papers, journal articles, technical manuals, computer program documentation, drawings/specifications, and AGARD (Advisory Group for Aerospace Research and Development) reports (Table 4).

Because the different subgroups of the survey participants undoubtedly use and produce various types of information in different quantities and proportions, we also analyzed the responses of the university professors, administrators, and R&D engineers separately. Although the specific U.S.-Japanese ratios varied slightly, the pattern was consistent: The Japanese are able to spend more time producing and working with the technical information that is most essential to research, and they "have much less work-related 'mail' to sort through every day than their American counterparts" (Haas and Funk 1989, p. 365). We suspect that the two phenomena are related.

Prior Training in Technical Communication or Writing

As mentioned earlier, the attitude that readers are responsible for the success of communication can be regarded as both a cause and an effect of the lack of writing instruction in Japan. Because courses in technical communication are not offered at Japanese universities (Nakajima 1991, p. ET62), it was not surprising that only 14% of Japanese respondents had taken a course in technical communication/writing, compared to 60% of the Americans (Table 5). We surmise that the three Japanese who said they had taken such a course as undergraduates had studied in the U.S., and that the others received their training from their employers after completing their undergraduate degrees. Of the respondents who had taken such a course, 100% of the Japanese and 94% of the Americans found the course helpful.

Opinions Regarding Instruction in Technical Communication

The survey also confirmed that there is a lower awareness of or appreciation for the basic principles of technical communication in Japan. This attitude was reflected in Japanese respondents' opinions regarding an undergraduate course in technical communication for aerospace engineers and scientists. For example, the Japanese as a whole were far less likely than Americans to say that an undergraduate course in technical communication should be "taken for credit" or "taken as a required course" (Table 6).

TABLE 4

Median Number of Technical Information Products Used in the Past Six Months by Japanese and U.S. Aerospace Engineers and Scientists

	Japan	U.S.
Letters	5	10
Memos	1	10
Trade/promotional literature	2	4
Technical proposals	2	3
Audiovisual materials	2	5
U.S. government technical reports	2	5
Technical talks/presentations	5	8
Journal articles	6	6
Technical manuals	2	2
In-house technical reports	6	5
Abstracts	10	6
Conference/meeting papers	10	7
Drawings/specifications	5	3
AGARD technical reports	3	2
Computer program documentation	5	2

TABLE 5

Education in Technical Communication

	Japan	U.S.
Studied technical communication/writing	14%	60%
As undergraduates	1	26
After graduation	11	26
Both as undergraduates and after graduation	2	8
Courses were helpful	100	94

TABLE 6

Opinions Regarding an Undergraduate Course in Technical Communication for Aerospace Majors*

	Japan	U.S.
Should be taken	12%	84%
Taken for credit	53	84
Taken as non-credit	46	17
Taken as a required course	23	90
Taken as an elective course	80	22
Taken as part of an engineering course	48	60
Taken as a separate course	43	57
Taken as part of another course	10	13

*Percentages do not total 100 because respondents could answer "yes" to more than one.

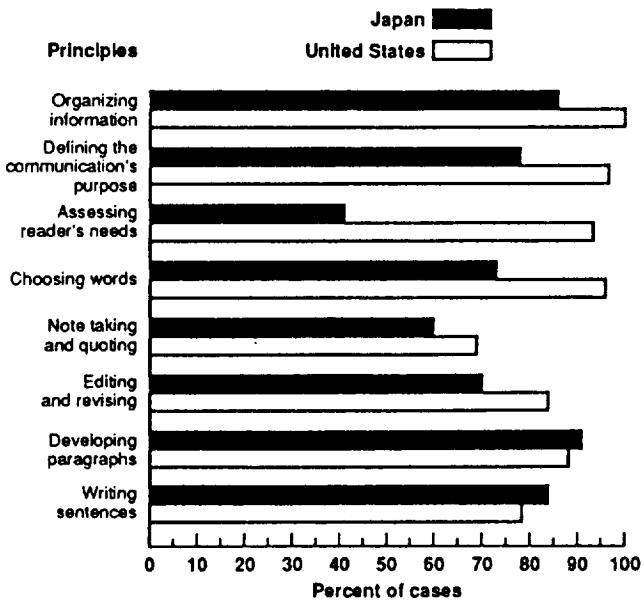

Figure 1. Principles recommended by Japanese and U.S. aerospace engineers and scientists for inclusion in an undergraduate technical communication course for aerospace majors.

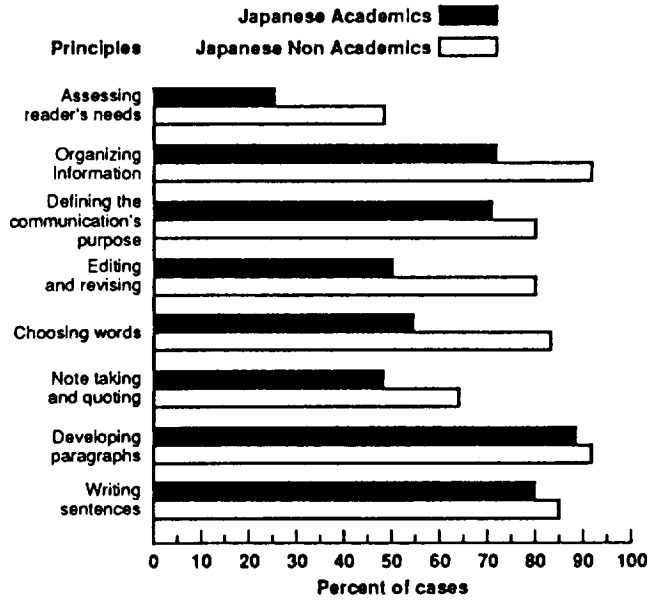

Figure 2. Principles recommended by Japanese academic and non-academic aerospace engineers and scientists for inclusion in an undergraduate technical communication course for aerospace majors.

They were far more likely to respond instead that such a course should be "taken as non-credit" or "taken as an elective course."

Participants were also asked which principles of technical communication and which mechanics of writing should be included in such a course. They were permitted to said "yes" to as many of the topics as they felt should be included. For most of the technical communication principles, a larger percentage of American respondents say "yes." For example, 97 percent of Americans said "yes" to "defining the communication's purpose" compared to 78 percent of the Japanese, and 93 per cent of Americans said "yes" to "assessing readers' needs" compared to only 41 percent of the Japanese (Figure 1).

In addition, it is interesting to note that the 27 Japanese university professors (28% of the Japanese sample) who participated in the survey consistently placed less value on technical communication principles than did the 64 (66.7%) Japanese respondents who were principally involved in research, design, and development (Figure 2). For example, only 25% of the Japanese professors said that "assessing readers' needs" should be included, compared to 48% of the R&D group. By contrast, the same "gulf" did not appear between American professors and the American R&D group (Figure 3). Thus, it seems that the attitude of "reader responsibility" is more entrenched in Japanese academia than it is in Japanese industry.

Because of the topics that were included in this portion of the survey, and because much of the technical information in Japan is produced in English, the Japanese respondents assumed that the course in question would be a course in technical English. As a result, the only technical communication principles that more Japanese than Americans recommended including were "developing paragraphs" and "writing sentences." As Hinds (1983a; 1983b) points out, Japanese has different patterns of organization and development from English; thus the concept of the paragraph as a unit of discourse is unfamiliar to Japanese writers and is difficult for them to master (Stevenson 1983, p. 324). Similarly, English sentence structures are difficult for the Japanese because Japanese sentence structures are so different.

A larger percentage of Japanese also said "yes" to including many of the mechanical conventions of writing (e.g., abbreviations, symbols, and acronyms) in a technical communication course (Figure 4) because the conventions of English are naturally also less familiar to them than to Americans.

Although the survey shows a clear need for technical communication courses in Japanese universities, it is unlikely that such courses will be added to

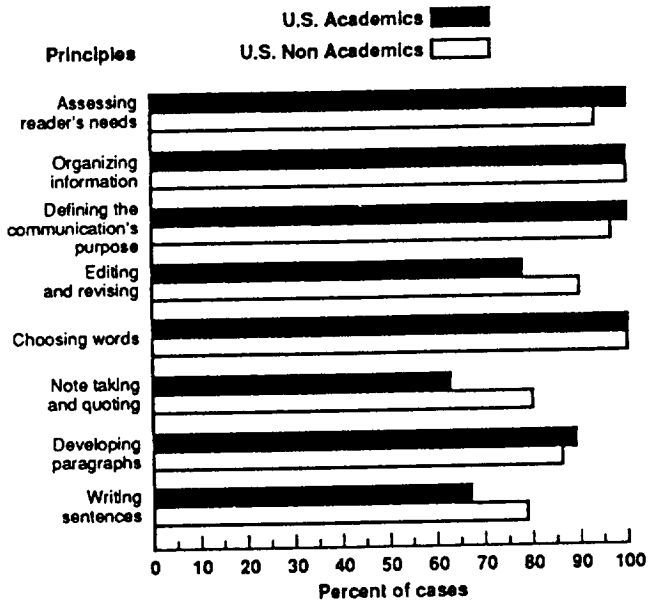

Figure 3. Principles recommended by U.S. academic and non-academic aerospace engineers and scientists for inclusion in an undergraduate technical communication course for aerospace majors.

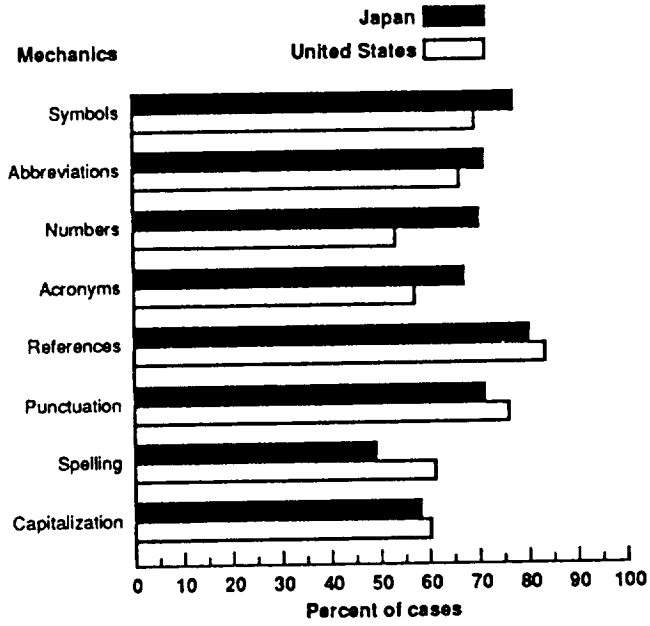

Figure 4. Mechanics recommended by Japanese and U.S. aerospace engineers and scientists for inclusion in an undergraduate technical communication course for aerospace majors.

the curriculum in the near future. According to Becker (1990), the higher education curriculum in Japan is very traditional. "Courses like Indian philosophy and Sanskrit are maintained, even if they have only one or two students per year. Conversely, neither the enrollment nor the faculty of business administration [for example] will substantially increase, even if the competition to enter Japanese business departments expands tenfold" (p. 436).

However, Japan also has a huge number of private institutes that offer instruction in English, and there is growing interest among both clients and administrators of these institutes in courses that focus specifically on technical English (usually referred to as English for Specific Purposes or English for Science and Technology). In addition, we can expect the number of technical communication courses offered by Japanese firms to continue to increase. Hence, the information provided by this survey could be useful both to substantiate the need for such courses and to guide the development of course content.

Other Issues Addressed by the Survey

The survey also asked respondents to state which of various electronic/information technologies they used as well as which sources of information they consulted when faced with solving a technical problem. Discussion of this part of the survey is beyond the scope of this article; however, readers who are interested in these data can contact the authors for further information.

Concluding Remarks

We believe that this survey is particularly interesting and worthwhile for a number of reasons:

- First, it provides empirical data to supplement and support much of the existing literature on Japanese communication practices.
- Second, it focuses specifically on Japanese technical communication, as opposed to interpersonal or business communication.
- Third, it provides insight into the effect of language and culture on communication practices.
- Fourth, it illustrates the importance of drawing on an understanding of a particular foreign language and culture when interpreting empirical data that have been collected in that culture.

Because the Japanese language and culture are so different from those of Western countries, it is important for us to look beyond surface comparisons to the underlying causes of cultural and societal differ-

ences. Only then can we achieve the understanding that is essential for effective communication. Non-Japanese technical communicators may want to consult the supplementary bibliography that we have provided for further information on Japanese communication.

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